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TOUCH PANEL INPUT DEVICE

[*Tacchi paneru nyuhryoku sohchi*]

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[There are no amendments to this patent.]

Specification

1. Title of the invention

Touch panel input device

2. Claim of the invention

(1) A touch panel input device provided with a touch panel where a first conductive sheet and a second conductive sheet are oriented to face one another with a small gap between them; voltage is applied to the aforementioned first conductive sheet to form a potential gradient, and the potential of the first conductive sheet at the contact point is detected by the second conductive sheet when the above-mentioned touch panel is pressed and the position where the pressure is applied is calculated, which touch panel input device is characterized by the fact that a current detection means that detects the current applied to the aforementioned first conductive sheet is provided, and a determination means that determines whether or not the touch panel is

pressed twice when the current is higher than usual based on a reference of the aforementioned current detection means as the potential is being detected from the aforementioned second conductive sheet.

3. Detailed description of the invention

(a) Field of industrial application

The present invention pertains to a touch panel input device capable of calculating the coordinates of applied pressure based on the potential detected from one of the conductive sheets, and the invention further pertains to an improvement in the double press detection system of the above-mentioned touch panel input device.

(b) Outline of the invention

In the touch panel input device of the present invention, when the touch panel is pressed twice, a parallel line is formed between two points pressed based on the first conductive sheet and second conductive sheet; thus, the overall resistance value is reduced, and the current that flows for formation of the potential gradient increases. Based on the above background, the current value is simultaneously determined when the potential at the contact point is detected, and when the current value is increased, in the present invention, it is determined that a double press has occurred.

(c) Prior art

A conventional resistance film analog type touch panel input device is shown in Fig. 3. The first conductive sheet and second conductive sheet are face one another with a small gap between them. Voltage is applied to the first conductive sheet via diodes 3. The voltage applied forms a potential difference along the entire length of the sheet and a potential gradient is formed.

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In the change-over switch 4, the polarity of the leader line for voltage application is reversed and

detection in the horizontal direction (X coordinate) and vertical direction (Y coordinate) is switched. Voltmeter 5 is connected to the second conductive sheet 2, and the potential formed on the second conductive sheet at the point of pressure (contact point) is readout. In this case, the internal resistance of the voltmeter 5 is very high and can be regarded as infinity, and the current that flows to earth via voltmeter can be regarded as 0, and resulting reduction in voltage can be regarded as 0 as well. Therefore, the potential distributed at the contact point 7 in the first conductive sheet 1 can be accurately detected by voltmeter 5. The equivalent circuit for the above-mentioned conditions is shown in Fig. 4. The above-mentioned voltage value is input to a microcomputer, and based on the voltage value input, the coordinates of contact point 7 are calculated by the microcomputer.

(d) Problems to be solved by the invention

However, when pressure is applied to multiple points simultaneously (double press) in the above-mentioned touch panel input device, a certain analog potential near the center point for the two areas pressed is detected by voltmeter 5. In this case, not only is it not possible to determine that a double press has occurred, but also entirely different position than the position pressed is calculated according to the potential detected.

Therefore, when the above-mentioned touch panel input device is used as a device such as an automatic transaction processor, the reliability of the device is significantly reduced.

Based on the above-mentioned background, the purpose of the present invention is to produce a touch panel input device capable of detecting a double press by observation of the change in the current flow in the first conductive sheet for formation of potential gradient.

(e) Means to solve the problem

The present invention is a touch panel input device characterized by the fact that a current detection means that detects current applied to the aforementioned first conductive sheet is provided, and a determination means that determines whether or not the touch panel is pressed twice when the current is higher than usual based on the reference of the aforementioned current

detection means as the potential is being detected from the aforementioned second conductive sheet in a touch panel input device provided with a touch panel where the first conductive sheet and second conductive sheet face one another with a small gap between them; current is applied to the aforementioned first conductive sheet to form a potential gradient and the potential of the first conductive sheet at the contact point is detected by the second conductive sheet when the above-mentioned touch panel is pressed and the position of the applied pressure is calculated.

(f) Work of the invention

As in the case of conventional analog touch panel input device, the contact point is calculated by the potential formed by the second conductive sheet in the touch panel input device of the present invention. When detection of the potential of the contact point is carried out, the current flowing in the first conductive sheet is measured simultaneously (current used for formation of potential gradient). Under normal conditions (when pressure is not applied to the touch panel or one point alone is pressed), the current flows inside the first conductive sheet alone, but when double press, parallel lines 13 and 14 are formed between the two points pressed as shown in Fig. 5, and the resistance value between the above-mentioned points is reduced, and overall current is increased. Upon observation of the above-mentioned state, double press can be detected.

(g) Working example

Fig. 1 shows the structure of the touch panel input device used as a working example of the present invention. In the figure, the same codes are used for the components as in the conventional touch panel input device (Fig. 3) and explanation is omitted. In the figure, ammeter 8 is inserted between diodes 3 that supply voltage to first conductive sheet 1 and change-over switch 4. The above-mentioned ammeter 8 measures the current for formation of the potential gradient for the first conductive sheet. The detected value from the ammeter is converted to a value that can be readout by microcomputer 6 via converter 9, and the result is input to the microcomputer.

Fig. 2 is the flow chart that shows action of the above-mentioned microcomputer.

Whether the current detection value is input from voltmeter 5 or not is determined at n1. When input is absent, change-over switch is switched at n5 and returns to n1.

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Furthermore, when potential detection value is input but the current value detected by ammeter 8 is higher than usual (n2), it is determined as a double press and cancelled and proceeds to n5.

When the potential detection value is input and no change is observed in the current value, it is regarded that the position is correctly pressed and the contact point (position) is calculated according to the value detected (n3). The above-mentioned calculated value is output to the control unit (input control unit of ATM, etc.) (n4), and change-over switch is switched (n5) and returns to n1. When change-over switch is switched at n5, (X,Y) coordinate can be measured.

Ammeter 8 and converter 9 correspond to the current detection means of the present invention, and n2 corresponds to the determination means of the present invention.

(h) Effect of the invention

As explained in detail above, according to the touch panel input device of the present invention, a double press can be detected based on the change in current flowing in the first conductive sheet, and a false detection or malfunction of device due to false detection as a result of double press can be prevented. As a result, reliability of devices such as ATM machines provided with the above-mentioned touch panel input device can be increased.

4. Brief description of figures

Fig. 1 is a schematic drawing of a working example of the touch panel input device of the present invention; Fig. 2 is a flow chart that shows action of the above-mentioned microcomputer; Fig. 3 is a schematic drawing of the touch panel input device of the prior art; Fig. 4 is the equivalent circuit when pressure is applied to one point of the touch panel input

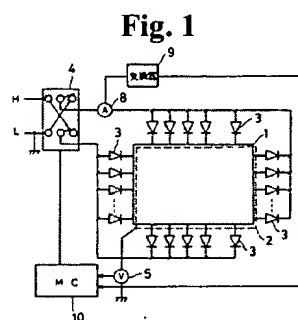
device, and Fig. 5 is an explanatory drawing of parallel lines formed when the touch panel input device is double pressed.

Explanation of codes

1: first conductive sheet, 2: second conductive sheet, 8: ammeter, 9: converter circuit.

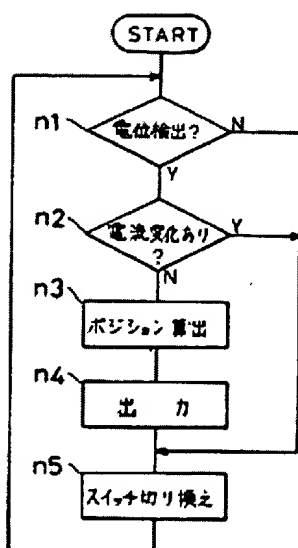
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9 – Analog to digital converter

Fig. 2



n1: Potential detection?

n2: Change in current?

n3: Calculation of position

n4: Output

n5: Change-over switch

Fig. 3

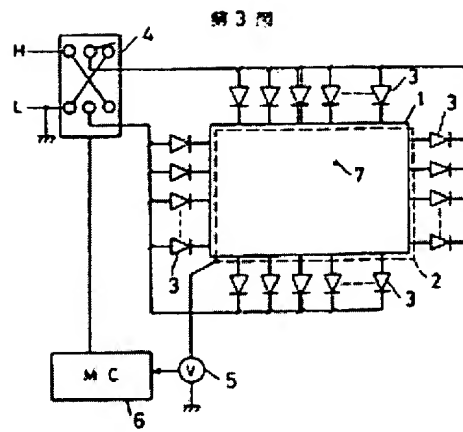


Fig. 4

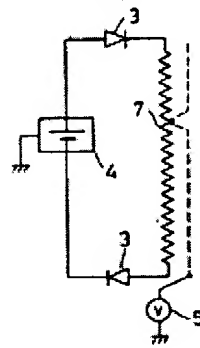


Fig. 5

